

Tacit Knowledge Externalization among Geographically Distributed Small Groups

By

Jamal Ahmad El-Den

A thesis submitted in fulfillment of the requirements for the

degree of

Doctor of Philosophy

University of Technology, Sydney

Australia

2009

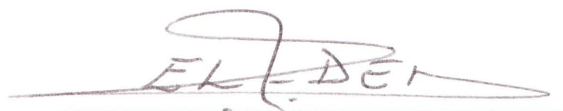
Certificate of Authorship/Originality

I certify that this work has not been submitted for any degree, or as part of the requirements for any previous degree or qualification.

I also certify that, unless cited, acknowledged or identified, all the work and materials this dissertation contains is original.

The translations of poetry presented in this dissertation are original unless otherwise acknowledged.

Signature of candidate

A handwritten signature in dark ink, appearing to read 'EL-DEN', is written over a horizontal line.

Jamal El-Den

ACKNOWLEDGMENT

I would like to express my gratitude to my supervisor, Prof. Igor Hawryszkiewicz for his valuable and constructive comments during the duration of my dissertation. I would also like to thank my wife Najwa and my daughters, Sarira and Souad, for their patience and constant support. I would also like to thank all my colleagues at the School of Business at the American University of Beirut for an extended support and help, in particular the Dean of the school Prof. George Najjar, and Prof. Khalil Hindi, Prof. Said El-Fakhani, and Prof. Ibrahim Osman. My thanks are also extended to Dr. Karma El-Hassan, Dr. Haluk Koksall (AUB), and Mrs. Ruth Warwick (CDU) for their diverse constructive help.

To Najwa, Sarira, and Souad

Table of Contents

CHAPTER 1 – Introduction	1
1.1 Background	2
1.2 Problem Statement	6
1.3 Motivation of the Dissertation	9
1.4 The Research Approach	13
1.5 The Empirical Work	14
1.6 Contribution to the Literature	15
1.7 Organization of the Thesis	16
 CHAPTER TWO – Literature Review, Hypotheses and Assumptions	 18
2.1 Theory of Knowledge and its Classification	18
2.1.1 Knowledge in perspective	18
2.1.2 Knowledge Classification	20
2.2 Tacit vs. Explicit Knowledge	22
2.2.1 Tacit Knowledge	22
2.2.2 Explicit Knowledge	25
2.3 Individual and Group Knowledge	29
2.4 Michael Polanyi's Perspective on Tacit Knowledge	30
2.5 Ikujiro Nonaka's perception on tacit and Explicit Knowledge	33
2.5.1 The knowledge crating company	34
2.5.2 The concept of Ba	35
2.6 Claus Otto Sharmer's Knowledge Perception	35
2.7 Tacit Knowledge Transformation	39
2.8 Knowledge Management, Knowledge Transformation and Measurement	44
2.9 Computer-Supported Cooperative Work, Groupware and Group memory	51
2.9.1 Computer-Supported Cooperative Work	52
2.9.2 Groupware	54
2.9.3 Group Memory	56
2.10 Current Tools for the Support of Distributed Individuals	57
2.11 Opinions and Ideas Definitions	62
2.11.1 Opinions	62
2.11.2 Ideas	63

2.12 Hypotheses and Assumptions	64
2.11.1 Hypotheses	64
2.11.2 Assumptions	65
 CHAPTER THREE – Methodology	 70
3.1 The Thesis' Methodology	70
3.2 Steps of the Methodology	71
3.2.1 Design Science	73
3.2.1.1 Design of an Artifact	74
3.2.1.2 Problem Relevance	75
3.2.1.3 Design Evaluation	76
3.2.1.4 Research Contribution	77
3.2.1.5 Research Rigor	78
3.2.1.6 Design as a Research Process	79
3.2.1.7 Communication of the Research	81
 CHAPTER FOUR – Definitions, Theories and Concepts	 84
4.1 Introduction	84
4.2 Opinions and Ideas as Parts of Tacit Knowledge	85
4.3 Definitions	98
4.3.1 Knowledge Management Definition	99
4.3.2 Value Knowledge	99
4.3.3 Transformed Knowledge	100
4.3.4 Group Memory	100
4.4 The Model Structure	101
4.5 The dissertation's Management of Knowledge Cycle	107
4.6 Knowledge Transformation among Geographically Distributed Virtual Group Members	116
4.7 Representation of Knowledge as an Object	122
 CHAPTER FIVE – Technologies for Knowledge Externalization:	

An Example Tool for Categorized Tacit Knowledge Types’ Externalization	129
5.1 Introduction	129
5.2 The Need for an Integrated Tool	131
5.3 The Developed Tool as an Integral Tool for the Knowledge Externalization process	140
5.4 Summary of the Tool’s Activities	143
5.4.1 Support for KM cycle and knowledge externalization	147
5.4.2 KM cycle support	148
5.4.2.1 Support for knowledge transformation	150
5.4.2.2 Support for knowledge creation	150
5.4.2.3 Support for knowledge initiation	152
5.4.2.4 Support for knowledge nurture	152
5.4.3 Supporting and Coordinating Multiple-Functionalities	153
5.4.4 Support for Awareness	158
5.5 Coding	160
5.6 VIPGSS and Existing Group-Support Systems	162
 CHAPTER SIX – Experiment, Analysis and Results	 167
6.1 Introduction	167
6.2 Thesis’s Experiment and Analysis Methods	169
6.3 Development of the Questionnaire	171
6.4 Analysis Method	171
6.4.1 Capability	172
6.4.2 Credibility	175
6.4.3 Extent of communication	175
6.5 Questionnaire’s Statistics, Analysis, Discussions and Results	176
6.5.1 Statistics	176
6.5.2 Reliability Analysis	186
6.5.3 Correlation Analysis	189
6.5.4 Cross-Tabulation Analysis	190

6.5.5 Regression Analysis	202
6.5.5.1 Analysis and Measurements	203
6.5.6 Justification of the Research Based on Sarker's 4C Platform	224
6.5.6.1 Capability	225
6.5.6.2 Credibility	226
6.5.6.3 Extent of Communication	227
6.5.6.4 Culture	228
6.5.7 Chapter's Conclusion	228
 CHAPTER SEVEN – Conclusion and Future Work	 230
7.1 Introduction	230
7.2 Categorization of Tacit Knowledge	231
7.3 Selection a Tool and a Measurement Process	232
7.4 Choice of a Method for Knowledge Externalization	233
7.5 Measurement of the Externalized categorized Types	233
7.6 Limitations and Implications of the Research	234
7.7 Future Work	235
Appendix A	236
Appendix B	238
REFERENCES	307

LIST OF FIGURES, TABLES, AND DIAGRAMS

FIGURES

Figure 2.1 Scharmer’s Epistemological Model	36
Figure 4.1 Welsham’s Basic Communication Diagram	85
Figure 4.2 The Proposed reflection-articulation-interpretation model	86
Figure 4.3 Model for knowledge creation in remote cooperative settings	101
Figure 4.4 Processes in remote knowledge transformation in distributed Environments	105
Figure 4.5 Weick’ organizing process	106
Figure 4.6 Spiral for knowledge transformation in virtual settings	117
Figure 5.1 Distributed GSS research framework	134
Figure 5.2 Navigation design in VIPGSS	148
Figure 5.3 The workspace access structure in VIPGSS	156

TABLES

Table 2.1 Extracts from the literature classification of knowledge	22
Table 2.2 Aspects of tacit and explicit knowledge	28
Table 2.3 Literature views on individual and group knowledge	29
Table 2.4 Nonaka and Takeouchi’s externalization model	33
Table 2.5 Literature’ views on tacit and explicit knowledge	40
Table 2.6 Literature’ pluralistic views on knowledge	45
Table 3.1 Summary of the thesis’ methodology	73
Table 3.2 Application of Hevner’s guidelines	83
Table 4.1 Correspondences between tacit knowledge, opinions and ideas	97
Table 5.1 Categories of KM software	133
Table 5.2 Summary of few existing groupware technologies and features	138
Table 5.3 Examples of current tools for the knowledge conversion process	140
Table 5.4 VIPGSS as compared to Wiki and Blogs	166
Table 6.1 Correlation results among dependent and independent variables	190
Table 6.2 Summary of Cross Tabulation Analysis	201

DIAGRAMS

Diagram 2.1 Knowledge Interpretation	39
Diagram 4.1 The thesis' KM cycle	109
Diagram 4.2 The Nurture Process	114

Abstract

Currently, organizations are shifting their activities and processes from information-based to knowledge-based as a result of the emergence of organizational knowledge as the main, if not the only, competitive advantage between rival organizations. Accordingly, the management of what an organization knows and the activities of knowledge externalization, which incorporates creation, articulation, capture, transformation, nurture, and retention, as well as knowledge measurement has become a field of serious research. Two main obstacles have emerged as a result. One is associated with the definition of knowledge, and the second is whether in fact knowledge in general and tacit knowledge in particular can be managed, externalized and measured.

The literature does not provide a universal knowledge definition. Accordingly, knowledge is defined contextually by both researchers and organizations. As a result, researchers and organizations work to manage knowledge, externalize it and measure it dependent on how they define it or on available definitions.

Fortunately, the majority of researchers agree that knowledge is a duality, namely, tacit and explicit, and that its management should encompass both. Explicit knowledge management proved to be easy and successful because of its information-like nature and also because it could be implemented using existing information-based concepts and tools. In contrast, work on managing tacit knowledge proved to be difficult and unsuccessful because of the illusive nature of this type of knowledge, and because its capture and transformation in its entirety is extremely difficult, if not impossible. In addition, the majority of the literary work on knowledge externalization and measurement is associated with face-to-face interactions between individuals. Similar work which addresses the externalization and measurement of tacit knowledge among geographically distributed individuals is very limited if not non-existent.

This dissertation identifies the difficulties associated with managing tacit knowledge in its entirety among distributed individuals and proposes its categorization into types/kinds as a solution for its effective externalization and measurement. The categorization process implies the identification of those types or kinds of tacit knowledge which could be externalized and measured easier than others. This is in line with most researchers' beliefs; that there are parts of tacit knowledge which cannot be externalized and measured, such as intuitions, feelings, instincts, expertise and such. The parts which can be externalized and measured based on observations, learning, and experimentation are expertise, know-how and the like; while the parts which can be externalized and measured if articulated and nurtured are opinions, ideas and similar

The thesis, drawing upon Hevner's design theory, develops an artifact for the effective capture and transformation of categorized types of tacit knowledge among distributed small groups. It proposes opinions and ideas as types of tacit knowledge which can easily be externalized and measured among distributed individuals. It introduces concepts regarding how to nurture articulated opinions and ideas among such individuals. It also proposes an externalization process, as an amendment of

Nonaka and Takeouchi's 1995 face-to-face process, which identifies the stages of the externalization of the types in distributed environments.

The dissertation is organized into two main tasks. Firstly, an elaborate literature review, which paves the ground for the introduced methodology, is undertaken. Secondly, an experiment was conducted on small groups of students who used a developed example tool for their distributed cooperation and opinions and ideas externalization. The dissertation's methodology identifies four essential steps for the externalization and measurement of tacit knowledge. The experiment, which was based on Sarker's (2004) experimental guidelines, encompasses the use of a developed example tool by the students.

The thesis presents the findings of the experiment, and based on the analysis of the data collected from a questionnaire administered to the students, it demonstrates that the externalization and measurement of tacit knowledge can be successfully accomplished if it is categorized.